

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

**DEPARTMENT OF TEXTILE TECHNOLOGY
SUPPLEMENTARY EXAMINATIONS MAY 2006
YARN TECHNOLOGY II TXT 2107**

TIME: 3 HOURS

Total marks: 100

INSTRUCTIONS

Answer **ANY FOUR** questions.

- 1 (a) Given that the length of the intensive carding arc is 20mm, that of the subsequent carding arc is 45 mm, the speed of the main cylinder is 800 m/min and that of the worker roller is 5m/min.
- (i) Calculate the length of the carding arc. (5 m arks)
 - (ii) What conclusion are drawn on the function of the worker roller. (3 marks)
 - (iii) What are the possible operations used to increase the carding arc and what are their limitations. (10 marks)
- (b) How does the rotor groove affect the properties of rotor spun yarns, consider a wide and a narrow groove. (7 marks)
- 2 (a) Calculate the maximum permissible eccentricity given that the draft, diameter of the top and bottom rollers is 1 inch and the maximum permissible CV% of mass on the yarn caused by the drafting rollers is 5.7%. (8 marks)
- (b) A ring spinning machine is fed with three rovings with an average CV% of mass of 15% and produces a yarn with irregularity of 15% what is the CV% of mass introduced by the drafting rollers. (8 marks)
- (c) (i) Calculate the corrected traveller speed given that the spindle speed is 26 000 rpm, ring diameter is 57mm, front roller delivery speed is 40 m/min and the package circumference is 102 mm consider the take up k to be = 0.99. (4 marks)
- (ii) Calculate the twist factor introduced to the yarn of 25 tex. (3 marks)
- (iii) to maintain the same traveller speed, what will be the spindle speed if the ring diameter was reduced to 40 mm. (2 marks)

3 (a) Discuss four instruments used to determine the unevenness in linear density stating the advantages, disadvantages and explain how each instrument is used to test different yarn counts.

(20 marks)

(b) Calculate the maximum rotor speed that can be achieved given that the rotor diameter is 30mm and the explorable yarn breaking strength is 0.8 kg for a 32 tex yarn.

(5 marks)

4. Show that yarn tension in ring spinning is given by

$$F = \frac{\mu m w^2 r^2}{R}$$

Where μ is the coefficient of friction between the yarn and the traveller.

m = mass of the traveller

w – angular velocity of the traveller

R = radius of the ring

r = radius of the package

(20 marks)

(b) What practical conclusions are drawn from this formula?

(5 marks)

5 (a) Draw diagrams showing the interaction of the feed rollers, taker-in roller and the burr breast roller indicating how impurities are removed in.

(i) downward movement of the taker-in

(5 marks)

(ii) upward movement of the taker-in.

(5 marks)

(b) What is the significance of the relative speed of the liker-in and feed rollers on fibre breakages and impurity elimination.

(5 marks)

(c) (i) with the help of a clearly labelled diagram explain the principles of twist insertion in dref/friction spinning machine.

(3 marks)

(ii) Outline problems associated with this type of spinning mechanism.

(3 marks)

(iii) From the above principle (i) formulate a general expression for twist insertion in the system stating the factors that are constant and indicating the factors influencing variable factors.

END OF QUESTION PAPER

